

## IV.—Some new Late Pleistocene Voles and Lemmings.

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As some considerable time will elapse before my work dealing with the British Fossil Voles and Lemmings can be published, and as some of the Late Pleistocene forms throw considerable light upon certain problems of geographical distribution at present confronting zoologists, it seems advisable to publish the following diagnoses. I have, firstly, to thank Mr. W. J. Lewis Abbott, Dr. Frank Corner, Mr. A. S. Kennard, Dr. H. C. Male, and the Rev. E. Mullins for the loan of material, Mr. Oldfield Thomas for the facilities he has kindly afforded for examining the recent material in the British Museum, and Mr. Gerrit S. Miller for much valuable assistance and advice.

*Arvicola abbotti*, sp. n., foss.

*Type*.—An adult skull in the collection of Mr. Lewis Abbott from the Ightham Fissures (Late Pleistocene).

*Characters*.—Size large (condylo-basal length of adult skull 41.0 mm.). Skull showing extreme fossorial specialization; incisors straightened and protruding, the straightening far more pronounced than in any living member of the *A. scherman* group; incisive foramina very small; postorbital squamosal crests very weak; occiput, in adults, sloping forwards conspicuously, the interparietal becoming reduced and its posterior margin boldly convex instead of nearly straight; lambdoid crest markedly sinuous and ridge for *ligamentum nuchæ* prominent; mesopterygoid fossa very narrow, posterolateral palatal pits extensive, the fossæ for origin of *pterygoideus internus* muscle correspondingly increased in extension; mandible with very small angular process, the incisor root ascending nearly to condyle and making a strong hump externally; molar teeth very light, enamel pattern substantially as in *A. amphibius*.

*Measurements*.—Type skull: condylo-basal length 41 mm.; zygomatic breadth 25.2; interorbital constriction 4.8; occipital depth (median) 10.1; diasteme 14.0; molar series (alveolar) 9.5; condyle to alveolus of last molar 15.6.

*Specimens examined*.—Four complete and about a dozen fragmentary skulls from the Ightham Fissures.

*Remarks*.—*A. abbotti* is of great interest, since it affords the highest expression of that fossorial specialization which is seen beginning in the Scandinavian *A. terrestris*, and which is well developed in the *A. scherman* group of Central

and Southern Europe\*. It is distinguished from the living members of the latter group not only by its more highly specialized occipital region, but by the greater specialization of the pterygoid region and its larger size. So far as is known, the species is confined to the latest portion of the Pleistocene period in Britain, and has hitherto only been found in the deposits of the Ightham Fissures.

*Microtus corneri*, sp. n., foss.

*Type*.—An adult skull in the collection of Dr. Frank Corner from the Ightham Fissures (Late Pleistocene).

*Characters*.—Skull essentially as in *M. orcadensis* and its allies; nasals and maxillary tooth-row a little shorter, diasteme a little longer proportionally than in any of the living members of the group; incisors a little straighter and more protruding than in *M. orcadensis*; upper surface of superior ramus of maxillary root of zygoma thickened, fusiform expansion of maxilla and jugal more extensive than in *M. orcadensis* and *sandayensis*; interparietal shorter in proportion to width than in adult *M. orcadensis*, the adult *M. corneri* presenting the interparietal form of young *M. orcadensis*; brain-case differing from that of *M. orcadensis* in being somewhat narrower and more depressed, from *M. sandayensis* in being considerably narrower, and from that of *M. sarnius* in being proportionally broader. Taking the distance from interorbital constriction to lambdoid crest as 100, the breadth of the brain-case at front edge of squamosal root of zygoma amounts to

95 in *M. sandayensis westrae*. Type, B. M.

93 in *M. sandayensis*. B. M. 6. 11. 18. 9.

90 in *M. orcadensis*. B. M. 5. 12. 13. 2.

85 in *M. corneri*. Type.

78 in *M. sarnius*. B. M. ♂, 8. 9. 2. 27. Type.

The constricted interorbital region is shorter than in *M. orcadensis*, almost exactly as in *M. sandayensis*; molar teeth of normal *arvalis* pattern, very light.

*Measurements*.—Typeskull: condylo-basal length 28·8 mm.; zygomatic breadth 16·5; interorbital constriction 3·6; occipital breadth 13·0; occipital depth (median) 7·0; nasal 7·9; diasteme 9·1; maxillary tooth-row 6·2.

*Specimens examined*.—One perfect and more than a dozen fragmentary skulls, including one example from the Langwith Cave, Derbyshire; the others from the Ightham Fissures.

\* Miller, Proc. Biol. Soc. of Washington, 1910, March, pp. 19-22.

*Remarks.*—In view of what Dr. Forsyth Major has stated on a previous occasion\*, it is exceedingly satisfactory to find a Pleistocene forerunner of *M. orcadensis* upon the British mainland. In turn it may be stated that the existence of another member of the same group in the Channel Islands, *M. sarnius* †, seems to indicate that we received *M. corneri* from France. At Ightham we find in addition skulls of a smaller member of the *arvalis* group possessing close affinity with the *M. arvalis* of Belgium, and this I think came to Britain by another route—across the bed of the North Sea—during the last great elevation of North-western Europe in very late Pleistocene times. This subject is more fully dealt with in a paper shortly to be published in the ‘Proceedings of the Geologists’ Association.’

*Microtus anglicus*, sp. n., foss.

*Type.*—A nearly perfect adult skull in the collection of Dr. Frank Corner from the Ightham Fissures (Late Pleistocene).

*Characters.*—Skull essentially as in the Asiatic “*Stenocranium*” group of Kastschenko, long and narrow; rostrum long, broader than interorbital region; interorbital region greatly constricted, the temporal ridges in adults meeting early to form a long well-defined sagittal crest; zygomatic arches heavy and, for “*Stenocranium*,” flaring; postorbital (squamosal) processes prominent; brain-case shorter than in extreme “*Stenocranium*,” interparietal large, rather long antero-posteriorly; diasteme long; incisors protruding beyond nasal tips; palate narrow, boldly sculptured with deep postero-lateral pits and very narrow median septum.

Dentition: maxillary molars having the general pattern of *M. arvalis* group; mandibular molars, the anterior one with five closed triangles as usual, the fourth outer angle greatly reduced, so that the external border of anterior loop is perfectly straight typically; antero-external triangle of last lower molar greatly reduced; enamel sheet in all molars well differentiated, the thin portions, forming posterior walls of prisms of lower and anterior walls of prisms in upper molars, frequently obsolete.

\* Forsyth Major, Ann. & Mag. Nat. Hist. ser. 7, vol. xv. 1905, p. 324.

† Miller, Ann. & Mag. Nat. Hist. ser. 8, vol. iii. 1909, p. 420. The type of *M. sarnius* is very old and its skull very narrow. Mr. Miller was led accordingly to regard the species as a member of the *M. agrestis* group. Further material has turned up, and Mr. Miller now fully agrees with the view expressed above as to the affinity of this form.

*Measurements.*—Type skull: condylo-basal length 26.9 mm.; zygomatic breadth 14.0; interorbital constriction 2.7; occipital breadth 11.9; occipital depth (median) 6.4; nasal 7.1; diasteme 8.7; molar series (alveolus) 6.4.

*Specimens examined.*—Two nearly perfect and a very large series of imperfect skulls from the Ightham Fissures and numerous specimens from other Late Pleistocene deposits.

*Remarks.*—This species has long been known to palæontologists as a conspicuous element in the Late Pleistocene fauna of Western Europe, and they have hitherto followed the lead of Nehring in referring it to *M. gregalis* of Pallas. The skull-measurements given by Pallas show that whatever the imperfectly known *M. gregalis* may be it certainly has little to do with the fossil animal. The zygomatic and occipital breadths, when compared with the skull-length taken as 100, amount to 45.5 and 36.4 respectively in *M. gregalis*, and to 52.0 and 44.2 in *M. anglicus*. Among the living species of "*Stenocranium*" of which I have seen skulls or descriptions *M. tianshanicus*, Büchner, appears to make the nearest approach to *M. anglicus* in skull and dentition; it differs principally in the narrower palate, narrower and shorter rostrum, and lighter zygomatic arches.

*Dicrostonyx henseli*, sp. n., foss.

*Type.*—A perfect adult skull in the collection of Mr. Lewis Abbott from the Ightham Fissures.

*Characters.*—Size small. Skull: dorsal outline gently convex; combined nasal width little more than a third of nasal length; zygomatic arches flaring more than in *D. torquatus* (Discovery Bay); palate feebly sculptured with complete postero-lateral bridges; auditory bullæ very small, egg-shaped, and not inflated anteriorly; presphenoid reduced to a slender rod; molars heavy.

*Dentition:* in the anterior upper molar the fourth or postero-internal prism is reduced, its hinder wall has lost its primitive curvature and passes into the posterior wall of the small fourth outer triangle without forming any minute postero-internal accessory (*i. e.* vestigial) angulation; in the second upper cheek-tooth the third inner prism is similarly reduced; antero-external triangle of last lower molar much smaller than second one, and passes in front into the anterior wall of the tooth without forming any minute antero-external vestigial angulation.

*Measurements.*—Type skull: condylo-basal length 28.6 mm.; zygomatic breadth 19.8; interorbital constriction 4.0; occi-

pital breadth 14·0; occipital height (median) 6·8; breadth of rostrum 5·9; nasal 8·7; diasteme 9·2; molar series (alveolar) 7·4.

*Specimens examined.*—One perfect and two fragmentary skulls, together with a large number of lower jaws from the Ightham Fissures; two or three maxillæ with teeth and numerous lower jaws from the Doneraile Cave, Co. Clare (kindly lent by Dr. Schaff); and a maxilla from the Langwith Cave, Derbyshire.

*Remarks.*—The more reduced maxillary molar pattern differentiates *D. henseli* from *D. torquatus* and its allies and connects this species dentally with *D. hudsonius*. The latter species is of larger size, but, apart from the agreement in the teeth, the skull presents several points of similarity with the fossil. It is distinguished principally by its expanded nasals, rather broad and flat presphenoid, somewhat lighter teeth, and slightly longer diasteme. The skull long ago described by Hensel from the Pleistocene of Quedlinberg, in Saxony\*, appears to agree with that of the species here described, and as that acute observer pointed out first the dental distinction from *D. torquatus*†, the species is here named in his honour.

*Dicrostonyx gulielmi*, Sanford.

"*Arvicola*" *gulielmi*, Sanford, Quart. Journ. Geol. Soc. vol. xxvi. p. 125 (1870) (name given to lower jaws from Somerset caves).

*Lemmus torquatus*, var., Sanford, *op. cit.* pp. 124, 126 (skull from Somerset caves).

*Specimens examined.*—Anterior part of an adult skull and many lower jaws in the collection of the Rev. E. Mullins from the Langwith Cave, Derbyshire; parts of two skulls, a lower jaw, and detached teeth from a cave in the Wye Valley, collected by Miss Dorothy Bate (now in British Museum); and part of a youngish skull from Puy de Dôme, Nescher (B.M.).

*Characters.*—Size large. Skull: nasals much expanded in front, their combined width half the nasal length; zygomatic arches very heavy; palate boldly sculptured with incomplete lateral bridges; incisive foramina short and broad; presphenoid reduced to a slender bar; teeth very heavy.

Dentition: the posterior walls of the hinder inner triangles in the first and second maxillary molars not reduced, they

\* Hensel, Zeits. d. deutsch. geol. Ges. Bd. vii. p. 493, pl. xxv. figs. 12 & 13.

† *Ibid.* Bd. viii. p. 279, pl. xiii. fig. 1 a.

retain their curvature and thick enamel and form a more or less well-marked accessory or vestigial inner angulation behind; third or antero-external prism of last lower molar less reduced than in *D. henseli*, and there is frequently a more or less well-marked minute fourth outer vestigial angulation.

*Measurements.*—Langwith Cave skull: breadth of rostrum 7.0 mm.; length of nasal 9.5 (ca.); diasteme 9.6; molar series (alveolar) 8.3.

*Remarks.*—The maxillary teeth of the skull figured by Sanford from the Somerset caves (Q. J. G. S. xxvi. pl. viii. figs. 4 & 4 a) agree with those of the species here described and with *D. torquatus*. There is every reason to suppose that the lower jaw from the same place figured by Sanford (*loc. cit.* figs. 2 & 2 b), and to which he gave the name of "*Arvicola*" *guelmi*, belongs to the same species of *Dicrostonyx* as does the skull, despite the abnormal appearance of the last lower molar; and therefore, unless it can be shown that the lower jaw does come from a different species, the name of "*guelmi*" must be used for this species.

*D. guelmi* is distinguished from *D. torquatus*, with which it agrees in tooth form, by its considerably larger size, shorter and broader incisive foramina, broader nasals, and much heavier teeth. Dr. Forsyth Major as long ago as 1872\* called attention to the dental differences in the fossil forms and suggested that there were two species of *Dicrostonyx* in the Pleistocene deposits of Western Europe, and it affords me great pleasure to be able to support the suggestion by establishing it as a fact.

V. — *Microchærus erinaceus* (Wood). By C. FORSTER-COOPER, M.A., F.Z.S., Trinity College, Cambridge, University Demonstrator in Animal Morphology.

[Plate III.]

THIS revision of the interesting little form *Microchærus erinaceus* is the result of an examination of the specimens contained in the collection of the British Museum (Natural History) and in that of the Sedgwick Museum at Cambridge. I am indebted to Dr. A. Smith Woodward, F.R.S., and to Professor T. McKenny Hughes, F.R.S., for permission to study the specimens in their collections.

\* Forsyth Major, *Atti di Soc. Ital. di Scienz. Natur.* xv. p. 123 (1872).